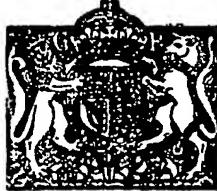


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## PATENT SPECIFICATION



*Application Date: April 8, 1926. No. 9308 / 26.*

**250,602**

*Complete Accepted: July 8, 1927.*

### COMPLETE SPECIFICATION.

#### Improvements in Airships.

We, JOHN ENLOE BROYLES, of Coco Solo, Panama Canal Zone, HENRY EMMET ROBERTSON, of Russellville, Cole County, Missouri, and THEODORE HENRY WEILER, of Russellville, Cole County, Missouri, all in the United States of America, and all citizens of the United States of America, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

The present invention relates to an air ship of the "lighter than air" type, and has for its principal object to provide an improved assemblage of power plants on the air ship.

The invention relates more particularly to a power plant assemblage of the kind in which a plurality of propeller mechanisms are mounted alongside the envelope of the air ship each with a prime mover, and in which means are provided for rotating the prime movers about both a vertical axis and a horizontal axis.

According to the present invention we provide a power plant assemblage of the above kind in which each of the propeller mechanisms comprises a prime mover capable of rotation about a vertical axis by means of a sleeve rotatable in a fixed hub, and of rotation about a horizontal axis on a pair of arms projecting upwardly from the sleeve.

Among the objects of the invention are to provide an assemblage whereby the power of pull of the propeller can be exerted at any angle desirable or at all angles without any power loss such as is occasioned by a swivel propeller due to gears, drive shafts, etc.; an assemblage which enables the installation or removal of an engine with the minimum amount of labor and inconvenience; an assemblage which reduces the fire hazard in the case of use on "lighter than air"

craft by engine being installed outside of hulls or gas envelopes where all sparks, etc., are carried away by the force of air from the propeller; which permits of installation at points on the airship where the force of wind from the propeller is not exerted against the airship when the prime mover is being used to help the airship to ascend vertically, thereby gaining more lift power; which permits the full horse power of the prime mover installed for the purpose of driving the propeller to be used as an additional source of lift to the airship; which permits the full horse power of the prime mover installed on it with the propeller to be used in forcing the airship to descend vertically or at any other angle; which permits the guiding of the airship at any desired angle while still maintaining a level keel which will be of great advantage and comfort for passengers of commercial airships of the future; which does away with the necessity of carrying tons of water ballast for maintaining the airship's equilibrium, thereby increasing the useful carrying capacity of the airship to a very profitable extent; which permits an airship to "take-off" vertically when loaded until the "heavier than air"; which permits the navigator to steer a straight course in spite of cross winds to the direction of the flight; which permits the navigator or pilot to hover over a spot desirable for dropping an anchor or bomb; which enables the airship to be manoeuvred into the hanger without the aid of a large field crew; and which enables all engines in the airship to be controlled by the minimum engineer force.

A still further object of the invention is to provide a propelling device which is exceedingly simple in construction, easy to manipulate and control, efficient and

[Price 1/-]

- reliable, not liable to readily get out of order, strong, durable, and otherwise well adapted to the purpose for which it is designed.
- 5 In the accompanying drawings:— Fig. 1 is a side elevation of an airship showing my improved power plants mounted thereon.
- 10 Fig. 2 is a detail elevation of one side of the power plants.
- Fig. 3 is a vertical section therethrough.
- Fig. 4 is a plan view of the stationary member thereof, and
- 15 Fig. 5 is a diagrammatic view showing the control for a group of the propelling structures.
- Referring to the drawing in detail, it will be seen that 1 designates the envelope 20 of the airship having the usual freight or passenger compartment or compartments 2 suspended therebelow. A plurality of propeller mechanisms are mounted alongside of the envelope 1.
- 25 There may be any number of these devices and as they are all of the same construction, only one will be described in detail as an example of all the others. The numeral 3 represents a platform or 30 other suitable supporting means on which is mounted a base 4 consisting of a ring 6 having radiating spokes 7 connected to a hub 8 which is of an elongated cylindrical construction having bearing races 35 9 and 10 at its upper and lower ends respectively. A plurality of braces 11 are connected to the top portion of the hub 8 radiates therefrom and inclined downwardly to be fixed to the ring 6. A sleeve 13 is disposed in the hub to rotate therein and is provided at its upper end with a bearing race 14 which cooperates with the race 9 for holding suitable ball bearings therebetween as shown in Fig. 40
- 45 3. A race nut 15 is threaded on the lower end of the sleeve 13 and cooperates with the race 10 for holding bearings therebetween as may also be seen in Figure 3. A sprocket 16 is suitably 50 mounted on the sleeve 13 so that upon rotation thereof the sleeve will also be rotated. A pair of arms 17 extend upwardly from the upper end of the sleeve 13 and receive rotatably therebetween a suitable prime mover 18 by means of 55 pintles 19 journaled in bearings 20. The prime mover shown in the drawing is in the form of an electric motor, but of course any other prime mover may be 60 substituted therefor without departing from the spirit of this invention. A shaft 21 projects rearwardly from the prime mover 18 and has journaled thereon an anti-friction roller 22 if desired, 65 which is movable between arcuate guides 23 extending from the upper end of the sleeve 13. These guides 23 are connected at their upper ends as at 24. A suitable propeller 25 is operatively mounted on the prime mover 18.
- A pair of cables 26 and 27 extend through the sleeve 13. The cable 26 is attached to the forward end of the prime mover 18 while the cable 27 is attached to the rear end thereof or to the shaft 21. Thus, by pulling these cables 26 and 27 the prime mover may be swung about its transverse axis in a vertical plane. A chain 28 is trained over the sprocket 16 so that the sleeve 13 may be rotated and the prime mover rotated horizontally.
- By way of example, in Figure 5, we have illustrated diagrammatically a system whereby two or more of the prime movers may be operated together, the cables 26 and 27 being connected about the sprocket of a steering wheel 29 by means of a chain section 30. These cables are trained over suitable pulleys 31 mounted at the lower end of the sleeve 13. The chain 28 is connected to cable sections 33 which in turn are connected to a chain section 34 which is trained about a sprocket operable by the steering wheel 35. Thus it will be seen that by operation of wheels 29 and 34, two of the prime movers may be adjusted as to both their vertical and horizontal axes as may be desirable. It is further apparent that this arrangement may be multiplied to include as many prime movers as may be desired. This grouping of the control of the prime movers will be governed entirely by the size, nature, and other features of the airship.
- With this invention it will be seen that the force of the propeller may be utilized in all different manœuvres of the airship, both in ascending, descending, moving forwardly, moving sidewise, and in compensating for cross winds and the like. Practically any manœuvre whatsoever may be made with an airship having the features of this invention incorporated therein.
- It is further apparent that changes in the details of construction, may be resorted to without departing from the spirit or scope of the invention as herein-after claimed or sacrificing any of its advantages.
- Having now particularly described and ascertained the nature of our said invention and in what manner the same is to be performed, we declare that what we claim is:—
1. A power plant assemblage for airships having a plurality of propeller mechanisms mounted alongside the envelope of the airship, each propeller

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- mechanism comprising a prime mover capable of rotation about a vertical axis by means of a sleeve rotatable in a fixed hub, and of rotation about a horizontal axis on a pair of arms projecting upwardly from the sleeve. 5
2. A propeller mechanism forming part of a power plant assemblage according to Claim 1 in which the prime mover is 10 rotatably mounted on the arms projecting upwardly from the sleeve by means of pintles journaled in bearings on the arms, and is provided with a rearwardly projecting shaft movable between arcuate guides extending from the sleeve. 15
3. A propeller mechanism according to Claim 2 having a fixed hub connected to a base mounted on suitable supporting means and consisting of a ring with 20 radiating spokes and provided with a plurality of braces for rigidly supporting the hub. .
4. A propeller mechanism according to Claim 2 in which the prime mover is
- rotated on the arms projecting upwardly 25 from the sleeve by means of flexible members passing through the sleeve and over guide pulleys the said flexible members having their ends attached to the prime mover. 30
5. A propeller mechanism according to the preceding claims and forming part of a power plant assemblage according to Claim 1 in which the sleeve is rotatable in the fixed hub by means of a chain 35 adapted to co-operate with a sprocket on the sleeve.
6. A power plant assemblage for airships having a plurality of propeller mechanisms constructed according to the 40 preceding claims and provided with means, substantially as described, whereby two or more of the prime movers may be operated together.

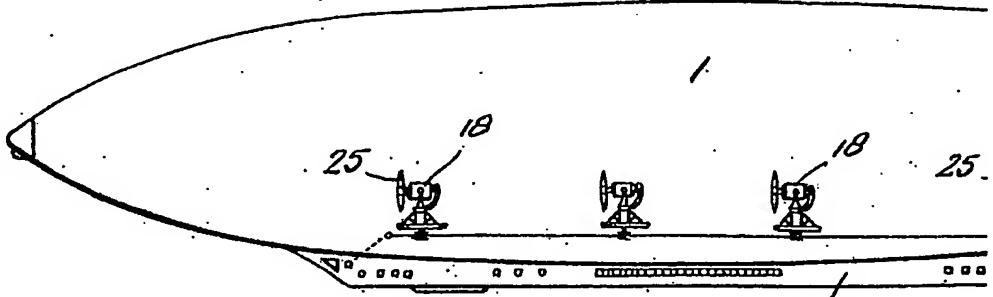
Dated this 7th day of April, 1926. 45  
H.Y. FAIRBROTHER,  
Chartered Patent Agent,  
30 and 32, Ludgate Hill, London, E.C. 4.

Redhill: Printed for His Majesty's Stationery Office, by Love & Malcomson, Ltd.—1927.

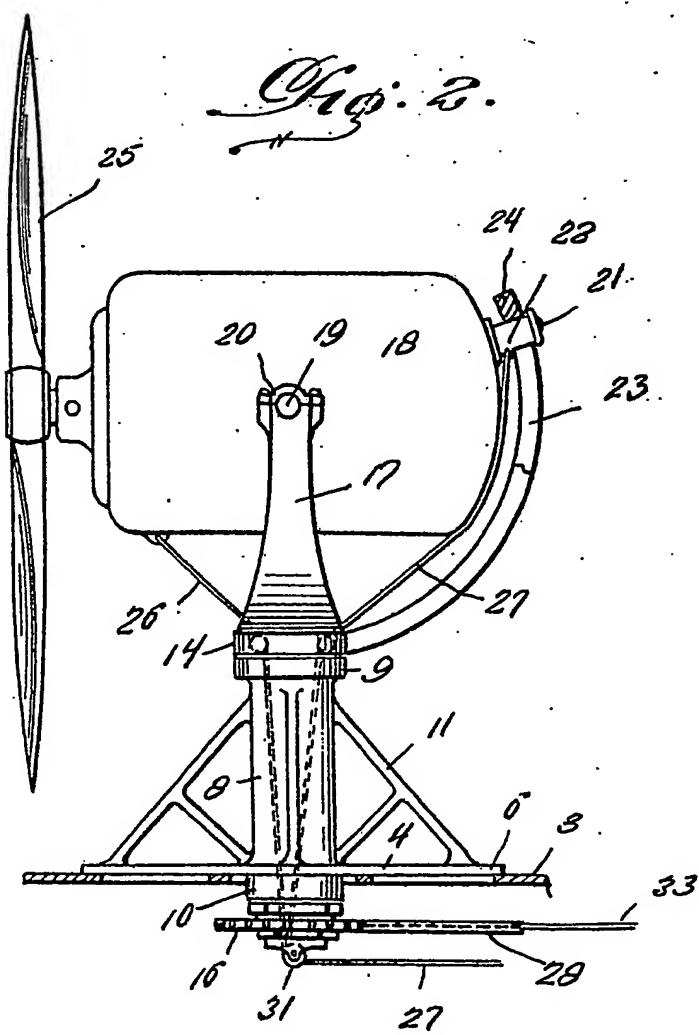
250,602 COMPLETE SPECIFICATION

*[This Drawing is a reproduction of the Original on a reduced scale.]*

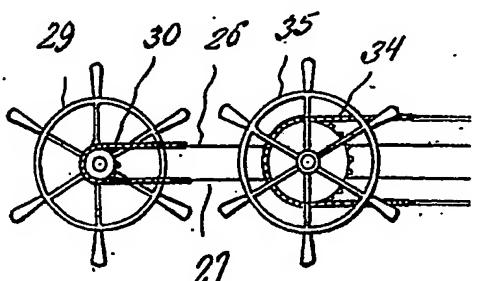
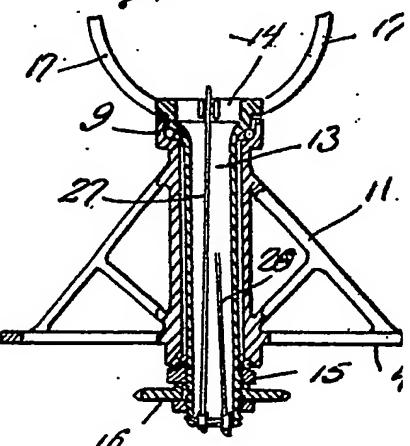
*Fig: 1.*

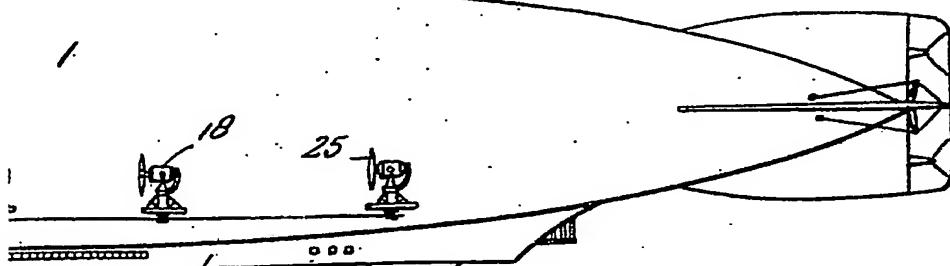
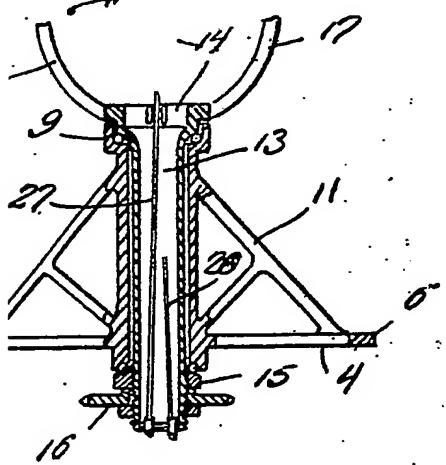
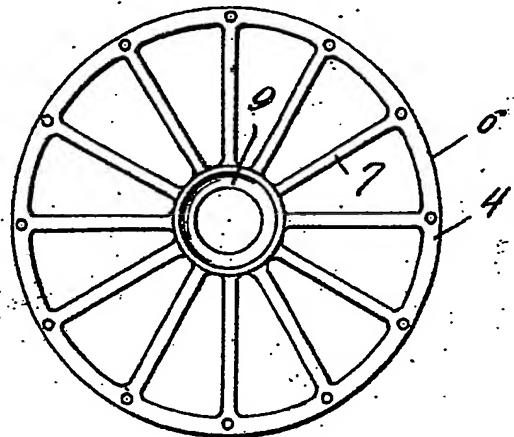
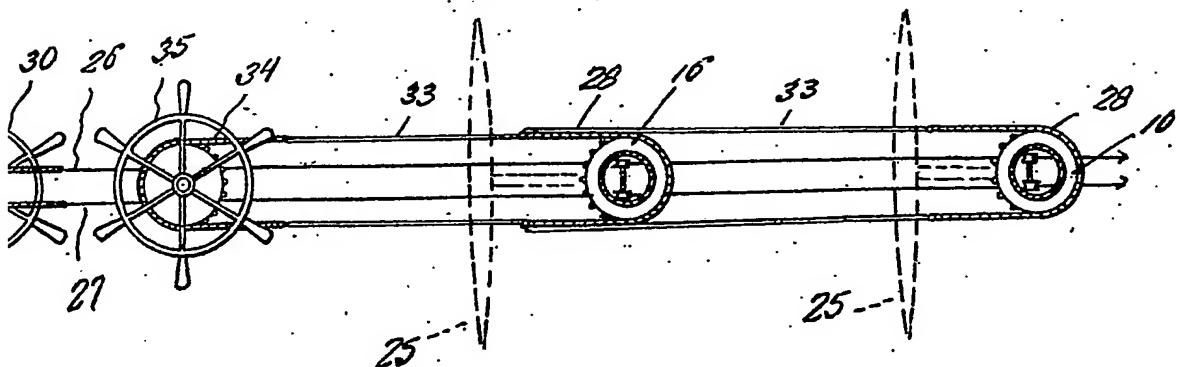


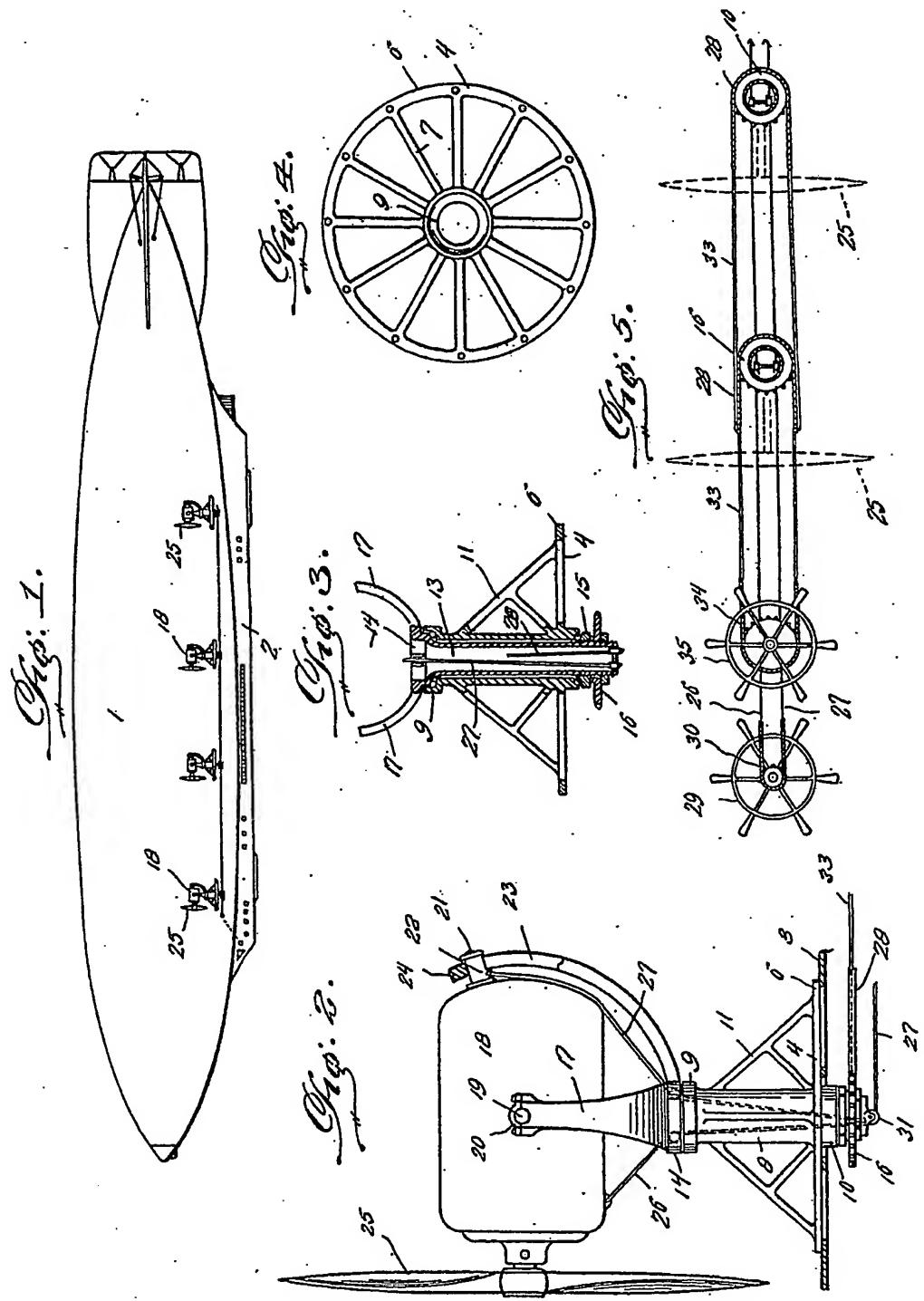
*Fig: 2.*



*Fig: 3.*



*Fig: 1.**Fig: 3.**Fig: 4.**Fig: 5.*



*[This Drawing is a reproduction of the Original on a reduced scale.]*